What is claimed is:

1. A semiconductor device comprising:

a semiconductor chip:

first and second radiation members thermally and electrically connected to the semiconductor chip interposed therebetween, and having a radiation surface for radiation heat from the semiconductor chip; and

first and second bonding members respectively interposed between the first radiation member and the semiconductor chip and between the semiconductor chip and the second radiation member, wherein:

the first and second radiation members are made of a metallic material that is superior to tungsten and molybdenum in at least one of an electrical conductivity and a thermal conductivity.

2. The method according to claim 1, further comprising an insulating film provided on a surface of one of the first and second radiation members at a side of the semiconductor chip, at a region other than a region where the one of the first and second radiation members are bonded to the semiconductor chip through one of the first and second bonding members.

3. The method according to claim 2, wherein:

the semiconductor chip has a guard ring at an edge portion thereof, the guard ring facing the insulating film

provided on the one of the first and second radiation members; and

the insulating film has an opening facing an inner portion of the semiconductor chip than the edge portion where the guard ring is provided.

4. The semiconductor device according to claim 1, wherein the radiation surface is composed of first and second radiation surfaces that are respectively side faces of the first and second radiation members, and are coplanar with each other.

5. The semiconductor device according to claim 1, further comprising a conductive member protruding from a surface of one of the first and second radiation members other than the radiation surface, for electrically connecting the semiconductor chip to an outside.

6. The semiconductor device according to claim 5, wherein the conductive member has first and second conductive members respectively protruding from first and second positions of the first and second radiation members in parallel with each other, the first and second positions being approximately identical with each other in a direction perpendicular to the radiation surface.

7. The semiconductor device according to claim 1,

wherein the first and second radiation members respectively have first and second radiation surfaces each of which is provided at an opposite side of the semiconductor chip, and exposed to an outside for radiating heat.

8. The semiconductor device according to claim 7, further comprising an outside wiring member disposed on the first radiation surface, wherein:

the first radiation member has a screw hole opened on the first radiation surface and having a closed bottom;

the outside wiring member has a through hole at a position corresponding to the screw hole; and

a screw is inserted into the through hole and the screw hole to fix the outside wiring member to the first radiation member.

9. The semiconductor device according to claim 1, wherein each of the first and second radiation members has a space at an inside thereof for reducing rigidity thereof.

10. The semiconductor device according to claim 1, wherein the metallic material contains one of copper and aluminum as a main component.

11. The semiconductor device according to claim 1, wherein the semiconductor chip and the first and second radiation members are sealed with a resin having a thermal

expansion coefficient approximate to that of the first and second radiation members.

12. The semiconductor device according to claim 1, wherein:

each of the first and second bonding members is composed of a plurality of bumps that form a plurality of spaces therebetween; and

the plurality of spaces provided among the plurality of bumps are filled with a resin.

13. The semiconductor device according to claim 1, wherein each of the first and second radiation members has a metallic portion at least as a part of a portion thereof facing the semiconductor chip, the metallic portion having a thermal expansion coefficient approximate to that of the semiconductor chip.

14. A semiconductor device, comprising:

first and second semiconductor chips: and

first and second radiation members thermally and electrically connected to the first and second semiconductor chips interposed therebetween through a bonding member, and having a radiation surface for radiation heat from the first and second semiconductor chips, wherein:

the first radiation member has first and second protruding portions protruding toward the first and second

semiconductor chips; and

first and second front end portions of the first and second protruding portions are thermally and electrically connected to the first and second semiconductor chips through the bonding member.

15. The semiconductor device according to claim 14, wherein the radiation surface is composed of first and second radiation surfaces of the first and second radiation members, the first and second radiation surfaces being respectively provided at an opposite side of the first and second semiconductor chips and being approximately parallel to each other.

16. The semiconductor device according to claim 14, wherein the radiation surface is composed of first and second radiation surfaces that are side faces of the first and second radiation members, and are approximately coplanar with each other.

17. The semiconductor device according to claim 14, further comprising an insulating film provided on one of the first and second radiation members at a side facing the first and second semiconductor chips, and at a portion other than portions connected to the first and second semiconductor chips through the bonding member.

18. The semiconductor device according to claim 14, further comprising a conductive member protruding from one of the first and second radiation members other than the radiation surface, for electrically connecting at least one of the first and second semiconductor chips to an outside.

19. The semiconductor device according to claim 18, wherein the conductive member has first and second conductive members respectively protruding from first and second positions of the first and second radiation members in parallel with each other, the first and second positions being approximately identical with each other in a direction perpendicular to the radiation surface.

20. The semiconductor device according to claim 14, further comprising an outside wiring member disposed on the radiation surface that is provided on a surface of one of the first and second radiation members at an opposite side of the first and second semiconductor chips, wherein:

the one of the first and second radiation members has a screw hole opened on the radiation surface and having a closed bottom;

the outside wiring member has a through hole at a position corresponding to the screw hole; and

a screw is inserted into the through hole and the screw hole to fix the outside wiring member to the one of the first and second radiation members.

21. The semiconductor device according to claim 14, wherein each of the first and second radiation members has a space at an inside thereof for reducing rigidity thereof.

22. The semiconductor device according to claim 14, wherein at least one of the first and second radiation members is made of a metallic material containing one of copper and aluminum as a main component.

23. The semiconductor device according to claim 14, wherein the first and second semiconductor chips and the first and second radiation members are sealed with a resin having a thermal expansion coefficient approximate to that of the first and second radiation members.

24. The semiconductor device according to claim 14, wherein:

the bonding member is composed of a plurality of bumps that form a plurality of spaces therebetween; and

the plurality of spaces provided among the plurality of bumps are filled with a resin.

25. A semiconductor device, comprising:

a semiconductor chip having an element formation surface and a back surface:

a first conductive member bonded to the element

formation surface of the semiconductor chip through a first bonding member having electrical conductivity;

a second conductive member bonded to the back surface of the semiconductor chip through a second bonding member having electrical conductivity; and

a third conductive member bonded to the first conductive member through a third bonding member having electrical conductivity, at an opposite side of the semiconductor chip,

wherein a bonding area between the first conductive member and the third conductive member is smaller than that between the first conductive member and the semiconductor chip.

26. The semiconductor chip according to claim 25, wherein the semiconductor chip, the first, second, and third conductive members are sealed with a sealing member to expose at least a surface part of one of the second and third conductive members from the sealing member.

27. The semiconductor device according to claim 26, wherein the first conductive member has a step portion facing an outer periphery of the resin, the step portion forming a thin thickness portion of the first conductive member.

28. The semiconductor device according to claim 27,

wherein the step portion of the first conductive member is covered with the sealing member.

29. The semiconductor device according to claim 27, wherein the first conducive member partially protrudes toward the third conductive member with the thin thickness portion facing the semiconductor chip.

30. The semiconductor device according to claim 26, wherein an outer surface portion of the first conductive member contacting the sealing member is oxidized.

31. The semiconductor device according to claim 25, further comprising an electrode provided on the element formation surface of the semiconductor chip, wherein:

an area of the electrode is approximately equal to the bonding area between the first conductive member and the semiconductor chip.

32. A semiconductor device, comprising:

a semiconductor chip having an element formation surface and a back surface at an opposite side of the element formation surface;

a first conductive member electrically connected to the element formation surface of the semiconductor chip;

a second conductive member electrically connected to the back surface of the semiconductor;

a third conductive member electrically connected to the first conductive member at an opposite side of the semiconductor chip; and

a sealing member sealing the element formation surface and the back surface of the semiconductor chip respectively electrically connected to the first and second conductive members, and a face of the third conductive member electrically connected to the first conductive member, wherein:

the first conductive member has a step portion at a portion facing an outer periphery of the sealing member, the first conductive member having a thin thickness portion by providing the step portion.

33. The semiconductor device according to claim 32, wherein the step portion of the first conductive member is covered with the sealing member.

34. The semiconductor device according to claim 32, wherein the first conducive member partially protrudes toward the third conductive member with the thin thickness portion facing the semiconductor chip.

35. The semiconductor device according to claim 32, wherein an outer surface portion of the first conductive member contacting the sealing member is oxidized.

36. The semiconductor device according to claim 32, further comprising an electrode provided on the element formation surface of the semiconductor chip, wherein:

an area of the electrode is approximately equal to a bonding area between the first conductive member and the semiconductor chip.

37. A semiconductor device, comprising:

a substrate made of Si, having an element formation surface and a back surface at an opposite side of the element formation surface;

an electrode formed on the element formation surface of the substrate and made of pure Al excluding an impurity; and

a barrier metal disposed between the electrode and the substrate, for preventing Si from being dissolved in the electrode.

38. The semiconductor device according to claim 37, further comprising a back side electrode formed on the back surface of the substrate and made of pure Al excluding an impurity;

39. The semiconductor device according to claim 37, further comprising a first radiation member bonded to the main surface of the substrate through the electrode to radiate heat generated from a semiconductor chip composed of

the substrate and the electrode.

40. The semiconductor device according to claim 39, wherein a direction in which the heat is radiated by the first radiation member corresponds to a direction progressing from the element formation surface to the back surface of the substrate.

41. The semiconductor device according to claim 39, further comprising:

a second radiation member bonded to the back surface of the substrate, and having a radiation surface; and

an outside cooling member contacting the radiation surface of the second radiation member at an opposite side of the substrate for facilitating radiation of the heat to an outside, wherein;

the first radiation member is connected to the second radiation member so that the heat generated from the element formation surface is radiated from the radiation surface of the second radiation member.

42. The semiconductor device according to claim 41, further comprising a high thermal conductivity substrate having high thermal conductivity and disposed between the first radiation member and the second radiation member.

43. A semiconductor device, comprising:

a semiconductor chip having a first surface and a second surface:

a first radiation member bonded to the first surface of the semiconductor chip through a first bonding member having thermal conductivity; and

a second radiation member bonded to the second surface of the semiconductor chip through a second bonding member having thermal conductivity, the second radiation member having a concave portion for holding therein the semiconductor chip therein.

44. The semiconductor device according to claim 43, wherein:

the first radiation member has a convex portion protruding toward the semiconductor chip; and

the convex portion is bonded to the semiconductor chip through the first bonding member.

45. The semiconductor device according to claim 43, further comprising:

a control electrode provided on the first surface of the semiconductor chip; and

a lead frame electrically connected to the control electrode.

46. The semiconductor device according to claim 45, wherein one of the first radiation member and the second

radiation member has a protruding portion at a side of the semiconductor chip, the protruding portion being inserted into a hole formed in the lead frame to fix the one of the first radiation member and the second radiation member to the lead frame.

47. The semiconductor device according to claim 45, wherein one of the first radiation member and the second radiation member has a protruding portion at a side of the semiconductor chip, the protruding portion being inserted into a hole formed in the lead frame with a spacer interposed between the lead frame and the one of the first radiation member and the second radiation member, the spacer positioning the one of the first radiation member and the second radiation member with respect to the semiconductor chip in a thickness direction of the semiconductor chip.

48. The semiconductor device according to claim 43, wherein one of the first radiation member and the second radiation member is composed of a copper member and a plurality of portions disposed partially inside the copper member and made of one of invar and molybdenum.

49. The semiconductor device according to claim 43, wherein the first radiation member, the semiconductor chip, and the second radiation member are sealed with a resin member in a state where each of the first radiation member

and the second radiation member has a surface exposed from the resin member at an opposite side of the semiconductor chip.

50. A semiconductor device, comprising:

a semiconductor chip having a first surface and a second surface:

a first radiation member having a convex portion that is bonded to the first surface of the semiconductor chip through a first bonding member having thermal conductivity; and

a second radiation member bonded to the second surface of the semiconductor chip through a second bonding member having thermal conductivity;

a control electrode provided on the first surface of the semiconductor chip;

a lead frame electrically connected to the control electrode, wherein:

one of the first radiation member and the second radiation member has a protruding portion at a side facing the semiconductor chip;

the protruding portion is fixedly inserted into a hole formed in the lead frame to fix the one of the first radiation member and the second radiation member; and

a spacer is disposed in a space defined between the one of the first radiation member and the second radiation member to position the one of the first radiation member and

the second radiation member, and the semiconductor chip in a thickness direction of the semiconductor chip.

51. The semiconductor device according to claim 50, wherein the first radiation member and the second radiation member are made of a metallic material having a linear thermal expansion coefficient approximate to that of the semiconductor chip.

52. The semiconductor device according to claim 50, wherein one of the first radiation member and the second radiation member is composed of a copper member and a plurality of portions disposed partially inside the copper member and made of one of invar and molybdenum.

53. The semiconductor device according to claim 50, wherein the first radiation member, the semiconductor chip, and the second radiation member are sealed with a resin member in a state where each of the first radiation member and the second radiation member has a surface exposed from the resin member at an opposite side of the semiconductor chip.

54. A semiconductor device, comprising:

a semiconductor chip having a first surface and a second surface;

a first conductive member bonded to the first surface

of the semiconductor chip through a first soldering member; and

a second conductive member bonded to the second surface of the semiconductor chip through a second soldering member, a fusing point of which is lower than that of the first soldering member.

55. The semiconductor device according to claim 54, wherein the second soldering member contains Sn at 90 wt% at least.

56. The semiconductor device according to claim 54, wherein the second conductive member has a recess portion in which the second soldering member is disposed.

57. The semiconductor device according to claim 54, wherein each of the first radiation member and the second radiation member serves simultaneously as an electrode and a radiation member for the semiconductor chip.

58. A method for manufacturing a semiconductor device, comprising:

bonding a semiconductor chip to a first conductive member with a first soldering member interposed therebetween;

bonding a second conductive member to the semiconductor chip with a second soldering member interposed

therebetween, the second soldering member having a fusing point lower than that of the first soldering member;

performing a reflow treatment only to the second soldering member; and

applying a pressure to the second conductive member from a side opposite to the semiconductor chip to control a degree of parallelization between the first conductive member and the second conductive member.

59. The method according to claim 58, wherein the second conductive member contains Sn at 90 wt% or more.

60. A method for manufacturing an electronic instrument, comprising:

interposing a heating element between first and second radiation members through a bonding member;

interposing a jig in a space defined between the first and second radiation members so that the jig contacts the first and second radiation members, the jig being for fixing a distance between the first and second radiation members;

externally pressurizing the first and second radiation members to bond the first and second radiation members and the heating element with the bonding member.

61. The method according to claim 60, wherein the jig has a thermal expansion coefficient larger than those of the first and second radiation members.

62. A method for manufacturing an electronic instrument, comprising:

interposing a heating element between first surfaces of first and second radiation members with a first bonding member interposed between the first surface of the first radiation member and the heating element, and a second bonding member interposed between the first surface of the second radiation member and the heating element;

preparing a first jig having a first protruding portion on a first jig surface thereon, and a second jig having a second protruding portion on a second jig surface thereon;

disposing the first jig with the first jig surface facing a second surface of the second radiation member, and the second jig with the second jig surface facing a second surface of the first radiation member;

making a front end portion of the first protruding portion abut the first surface of the first radiation member, and making a front end portion of the second protruding portion abut the first surface of the second radiation member while keeping a distance between the first jig and the second jig constant; and

pressuring the first and second radiation members from the second surfaces of the first and second radiation members to bond the first and second radiation members and the heating element with the first and second bonding

members.

63. The method according to claim 62, wherein the first radiation member has a through hole through which the second protruding portion passes.

64. The method according to claim 63, wherein the second radiation member has a through hole through which the first protruding portion passes.

65. The method according to claim 62, wherein the first and second radiation members are pressurized by an elastic force of a spring member.